FIG. 1

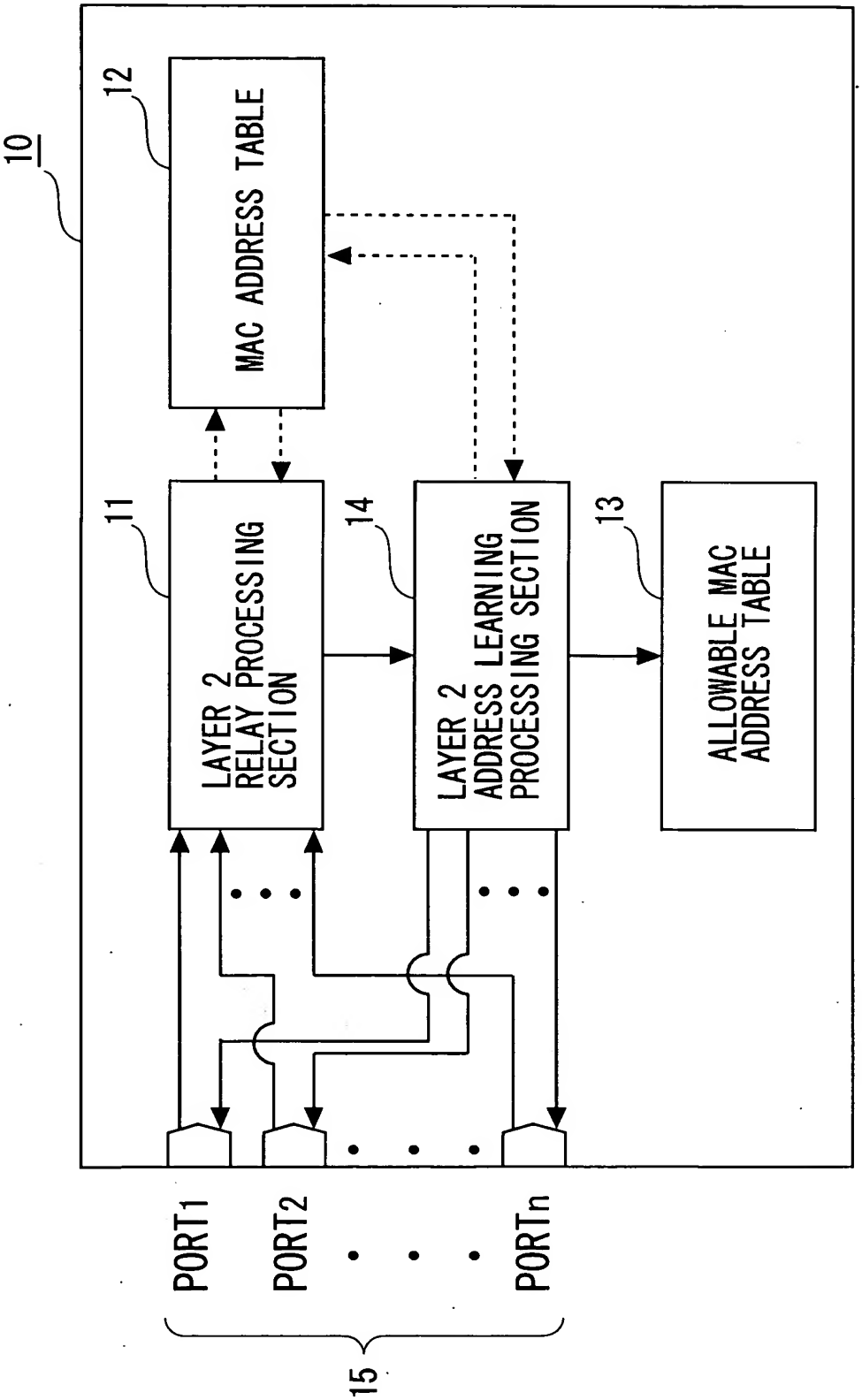

10
12
MAC ADDRESS TABLE
11
LAYER 2
RELAY PROCESSING
SECTION
14
LAYER 2
ADDRESS LEARNING
PROCESSING SECTION
13
ALLOWABLE MAC
ADDRESS TABLE
PORT1
PORT2
PORTn
15

FIG. 2

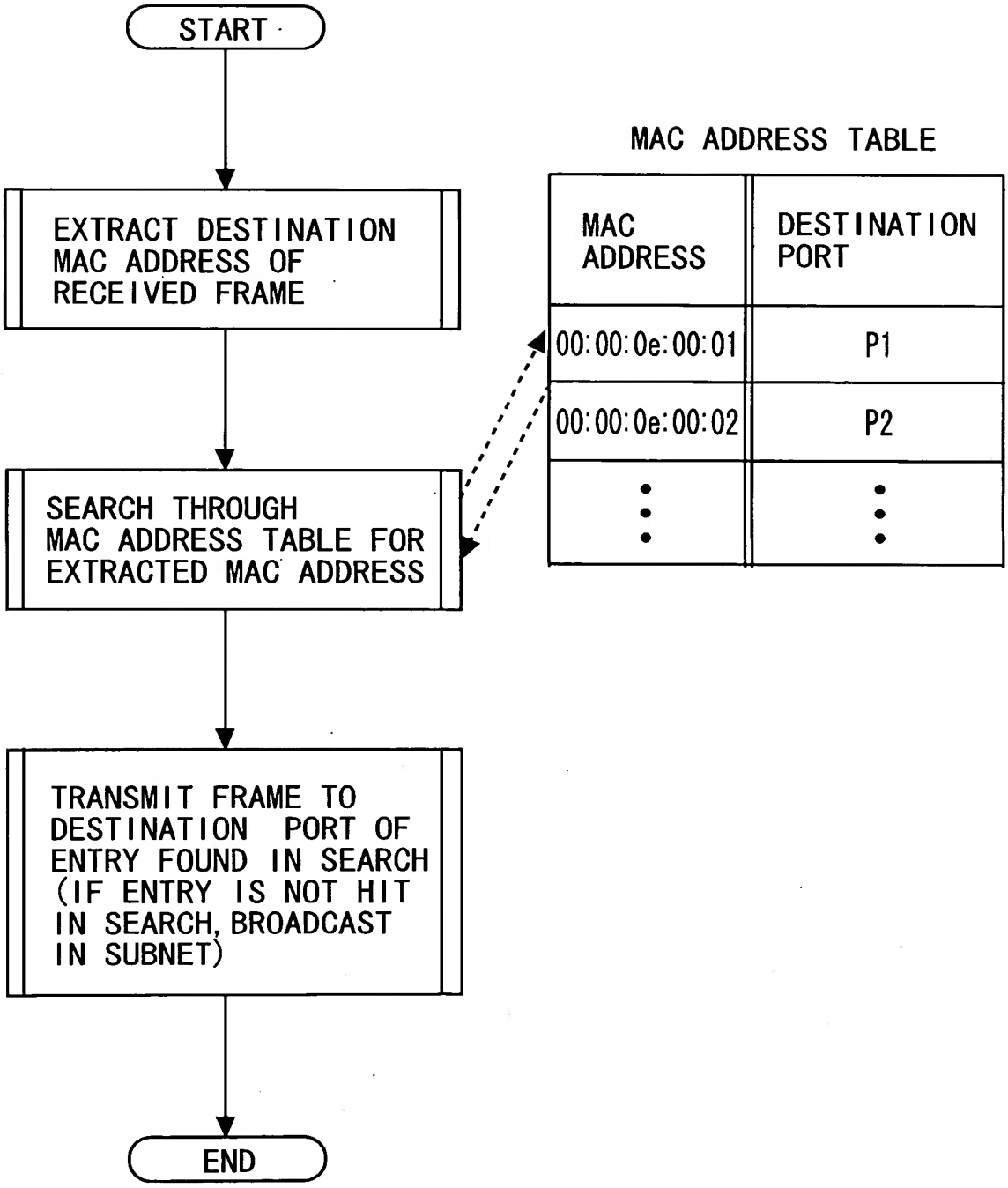

START
EXTRACT DESTINATION MAC ADDRESS OF RECEIVED FRAME
SEARCH THROUGH MAC ADDRESS TABLE FOR EXTRACTED MAC ADDRESS
TRANSMIT FRAME TO DESTINATION PORT OF ENTRY FOUND IN SEARCH (IF ENTRY IS NOT HIT IN SEARCH, BROADCAST IN SUBNET)
END
MAC ADDRESS TABLE
MAC ADDRESS
DESTINATION PORT
00:00:0e:00:01
P1
00:00:0e:00:02
P2

FIG. 3

MAC ADDRESS TABLE

12

MAC ADDRESS	IP ADDRESS	DESTINATION PORT	ROUTING OBJECT
00:00:0e:00:01	10.1.1.2	P1	○
00:00:0e:00:02	DON'T CARE	P2	×
⋮	⋮	⋮	⋮

FIG. 4

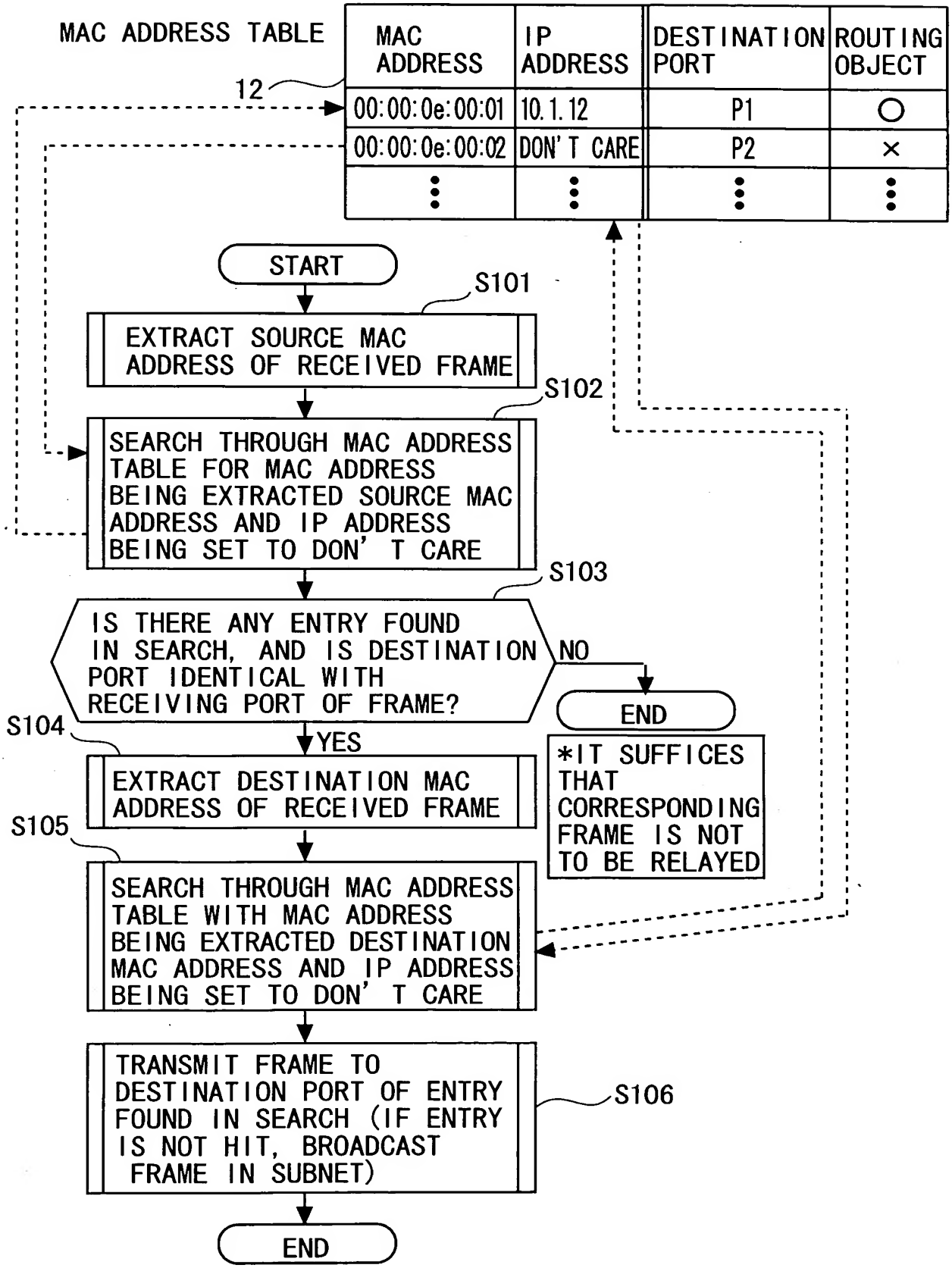

MAC ADDRESS TABLE
12
MAC ADDRESS
IP ADDRESS
DESTINATION PORT
ROUTING OBJECT
00:00:0e:00:01
10.1.12
P1
○
00:00:0e:00:02
DON'T CARE
P2
×
START
S101
EXTRACT SOURCE MAC ADDRESS OF RECEIVED FRAME
S102
SEARCH THROUGH MAC ADDRESS TABLE FOR MAC ADDRESS BEING EXTRACTED SOURCE MAC ADDRESS AND IP ADDRESS BEING SET TO DON'T CARE
S103
IS THERE ANY ENTRY FOUND IN SEARCH, AND IS DESTINATION PORT IDENTICAL WITH RECEIVING PORT OF FRAME?
NO
END
*IT SUFFICES THAT CORRESPONDING FRAME IS NOT TO BE RELAYED
YES
S104
EXTRACT DESTINATION MAC ADDRESS OF RECEIVED FRAME
S105
SEARCH THROUGH MAC ADDRESS TABLE WITH MAC ADDRESS BEING EXTRACTED DESTINATION MAC ADDRESS AND IP ADDRESS BEING SET TO DON'T CARE
TRANSMIT FRAME TO DESTINATION PORT OF ENTRY FOUND IN SEARCH (IF ENTRY IS NOT HIT, BROADCAST FRAME IN SUBNET)
S106
END

FIG. 5

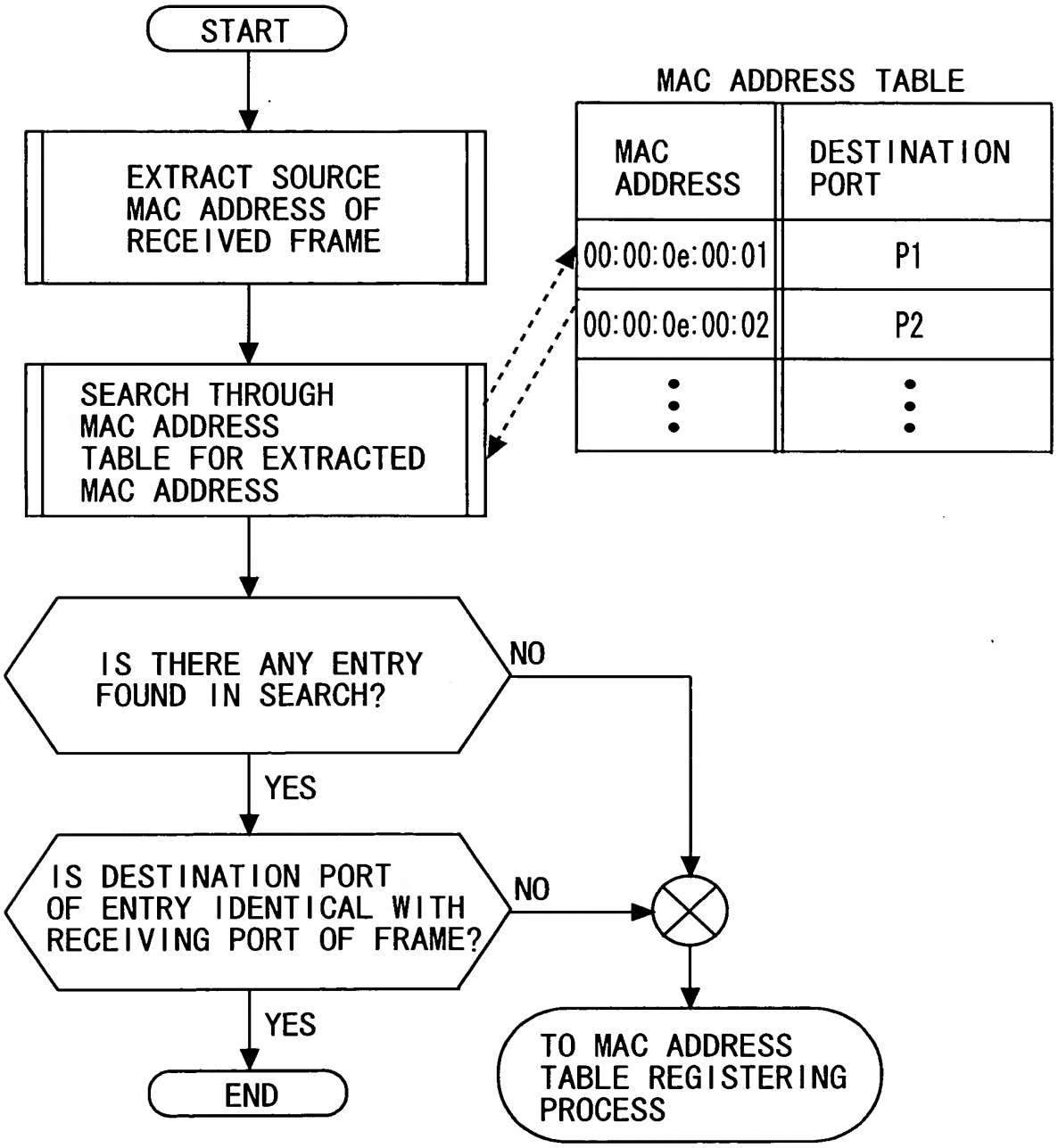

START
EXTRACT SOURCE MAC ADDRESS OF RECEIVED FRAME
SEARCH THROUGH MAC ADDRESS TABLE FOR EXTRACTED MAC ADDRESS
IS THERE ANY ENTRY FOUND IN SEARCH?
NO
YES
IS DESTINATION PORT OF ENTRY IDENTICAL WITH RECEIVING PORT OF FRAME?
NO
YES
END
TO MAC ADDRESS TABLE REGISTERING PROCESS
MAC ADDRESS TABLE
MAC ADDRESS
DESTINATION PORT
00:00:0e:00:01
P1
00:00:0e:00:02
P2

FIG. 6

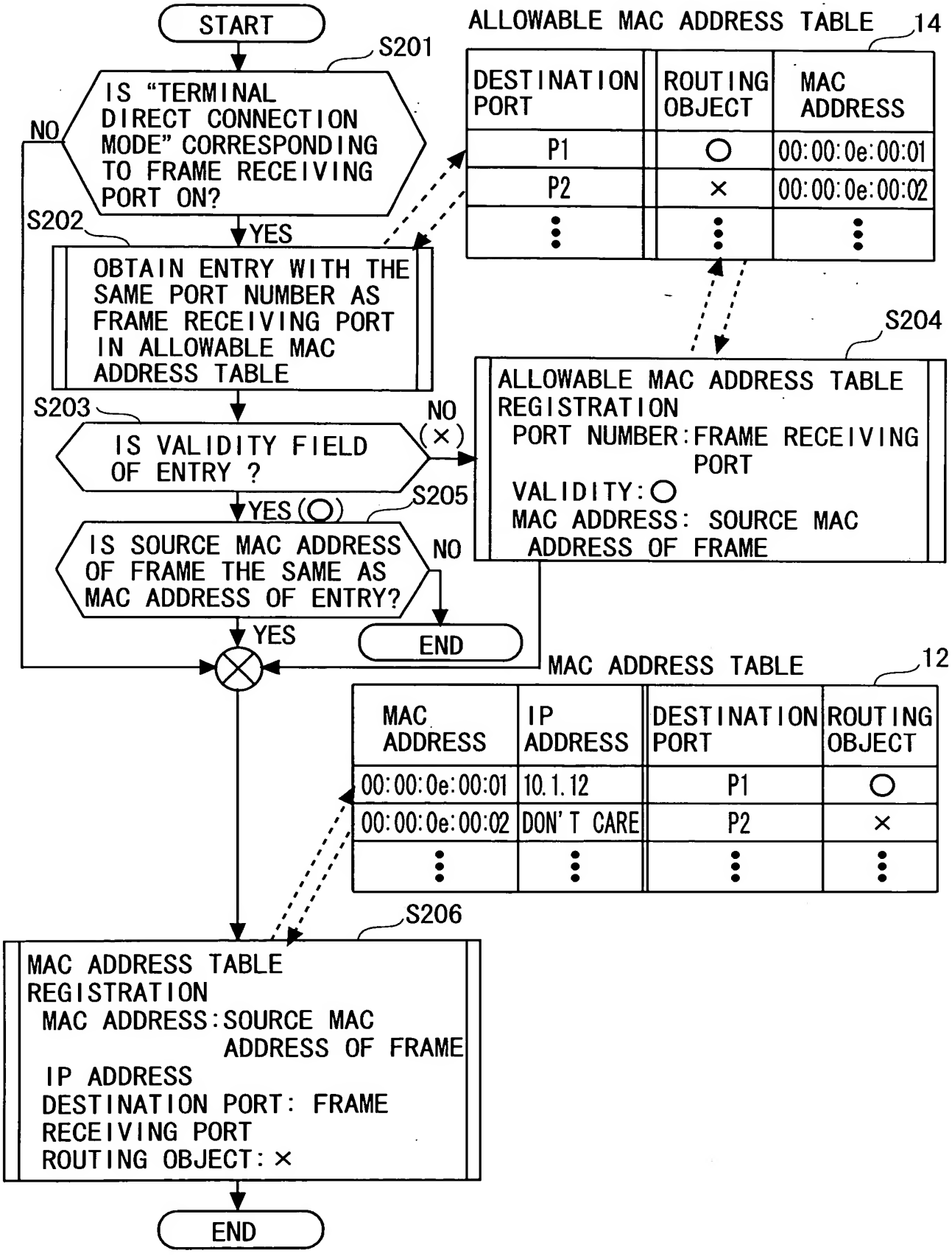

START
S201
IS "TERMINAL DIRECT CONNECTION MODE" CORRESPONDING TO FRAME RECEIVING PORT ON?
NO
YES
S202
OBTAIN ENTRY WITH THE SAME PORT NUMBER AS FRAME RECEIVING PORT IN ALLOWABLE MAC ADDRESS TABLE
S203
IS VALIDITY FIELD OF ENTRY ?
NO (×)
YES (○)
S205
IS SOURCE MAC ADDRESS OF FRAME THE SAME AS MAC ADDRESS OF ENTRY?
NO
YES
END
ALLOWABLE MAC ADDRESS TABLE
14
DESTINATION PORT
ROUTING OBJECT
MAC ADDRESS
P1
○
00:00:0e:00:01
P2
×
00:00:0e:00:02
S204
ALLOWABLE MAC ADDRESS TABLE REGISTRATION
PORT NUMBER: FRAME RECEIVING PORT
VALIDITY: ○
MAC ADDRESS: SOURCE MAC ADDRESS OF FRAME
MAC ADDRESS TABLE
12
MAC ADDRESS
IP ADDRESS
DESTINATION PORT
ROUTING OBJECT
00:00:0e:00:01
10.1.12
P1
○
00:00:0e:00:02
DON'T CARE
P2
×
S206
MAC ADDRESS TABLE REGISTRATION
MAC ADDRESS: SOURCE MAC ADDRESS OF FRAME
IP ADDRESS
DESTINATION PORT: FRAME RECEIVING PORT
ROUTING OBJECT: ×
END

FIG. 7

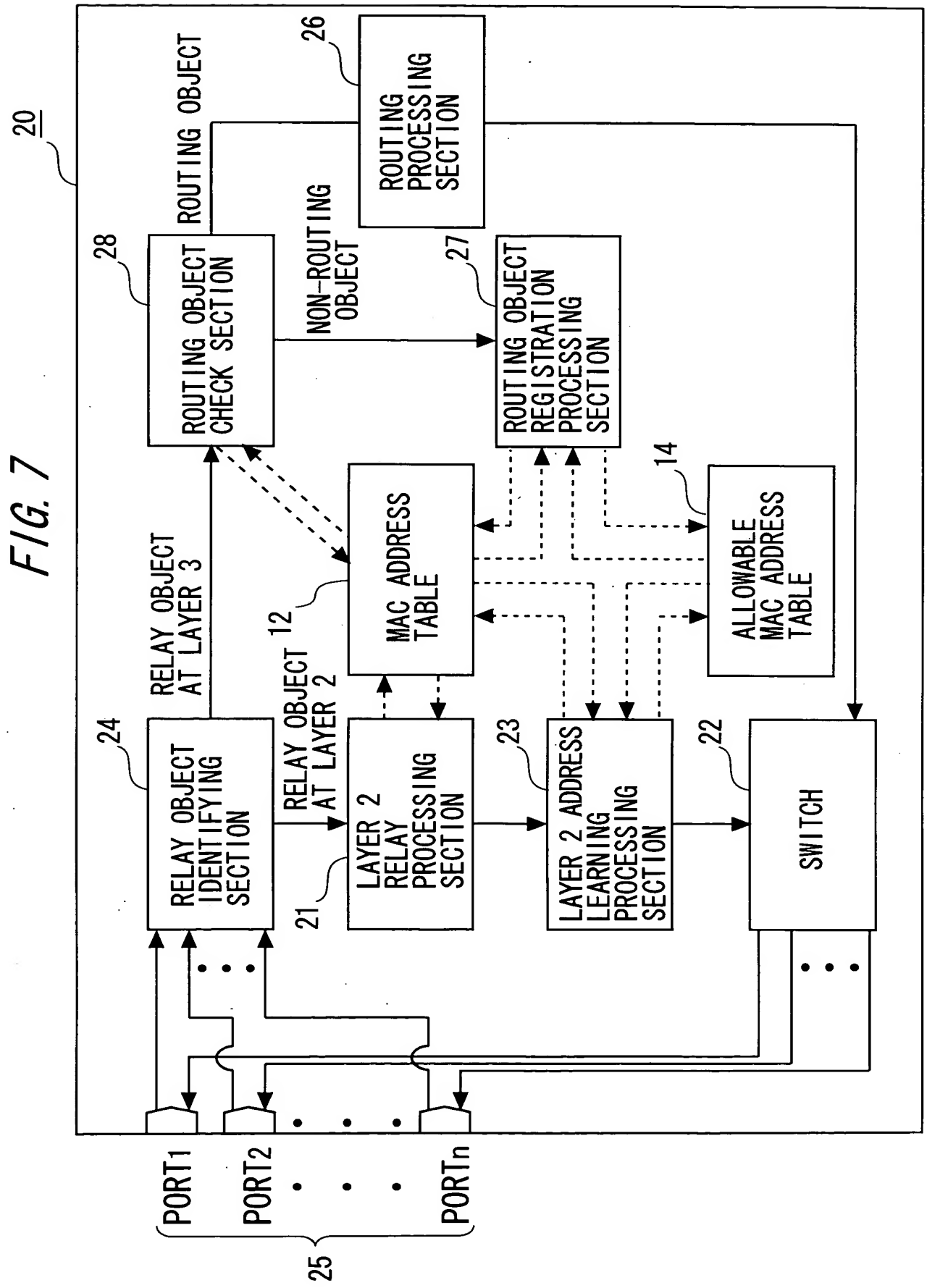

20
ROUTING OBJECT
26
ROUTING PROCESSING SECTION
28
ROUTING OBJECT CHECK SECTION
NON-ROUTING OBJECT
27
ROUTING OBJECT REGISTRATION PROCESSING SECTION
14
ALLOWABLE MAC ADDRESS TABLE
RELAY OBJECT AT LAYER 3
12
MAC ADDRESS TABLE
24
RELAY OBJECT IDENTIFYING SECTION
RELAY OBJECT AT LAYER 2
23
LAYER 2 ADDRESS LEARNING PROCESSING SECTION
22
SWITCH
21
LAYER 2 RELAY PROCESSING SECTION
PORT1
PORT2
PORTn
25

FIG. 8

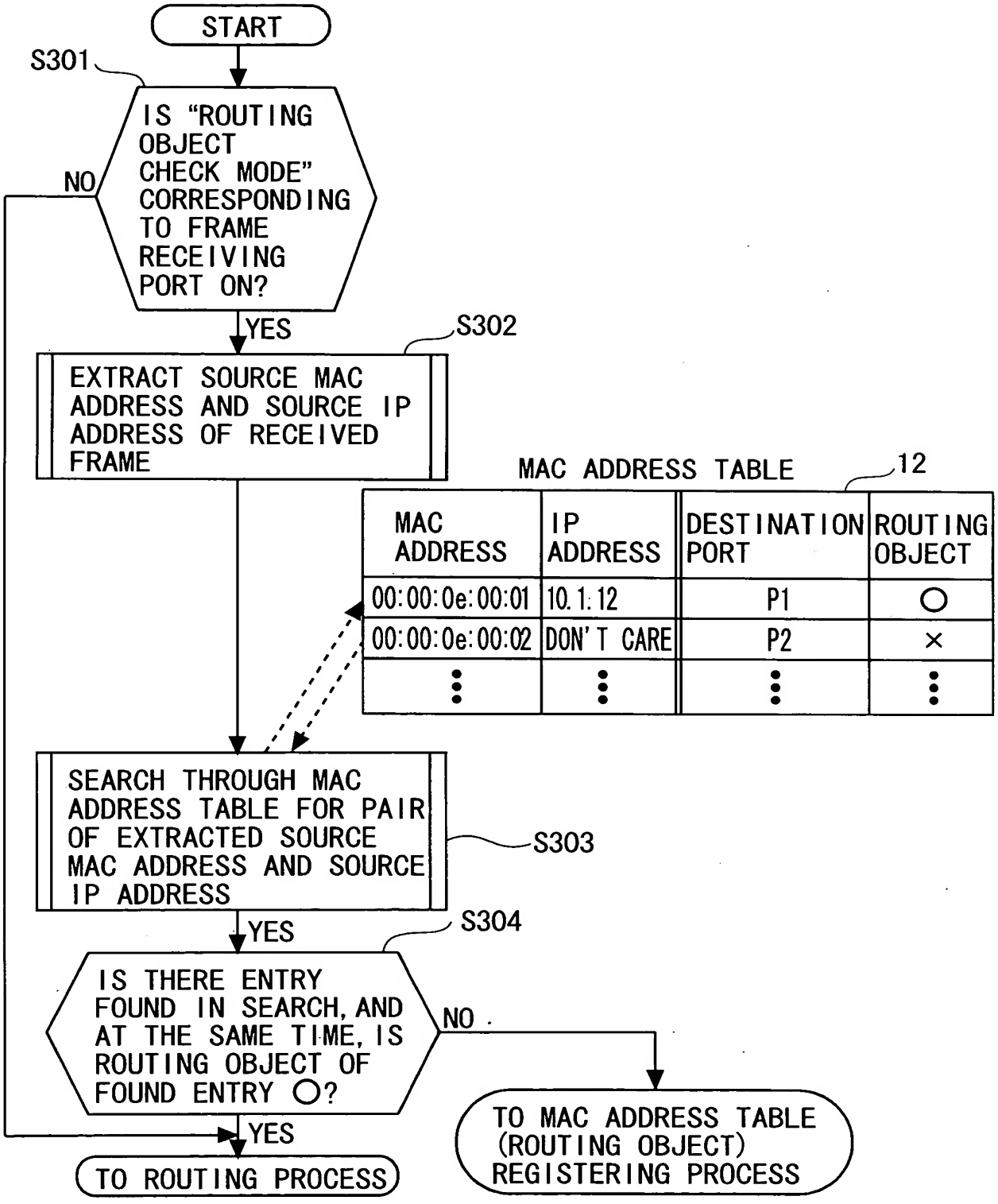

START
S301
IS "ROUTING OBJECT CHECK MODE" CORRESPONDING TO FRAME RECEIVING PORT ON?
NO
YES
S302
EXTRACT SOURCE MAC ADDRESS AND SOURCE IP ADDRESS OF RECEIVED FRAME
MAC ADDRESS TABLE
12
MAC ADDRESS
IP ADDRESS
DESTINATION PORT
ROUTING OBJECT
00:00:0e:00:01
10.1.12
P1
○
00:00:0e:00:02
DON'T CARE
P2
×
SEARCH THROUGH MAC ADDRESS TABLE FOR PAIR OF EXTRACTED SOURCE MAC ADDRESS AND SOURCE IP ADDRESS
S303
YES
S304
IS THERE ENTRY FOUND IN SEARCH, AND AT THE SAME TIME, IS ROUTING OBJECT OF FOUND ENTRY ○?
NO
YES
TO ROUTING PROCESS
TO MAC ADDRESS TABLE (ROUTING OBJECT) REGISTERING PROCESS

FIG. 9

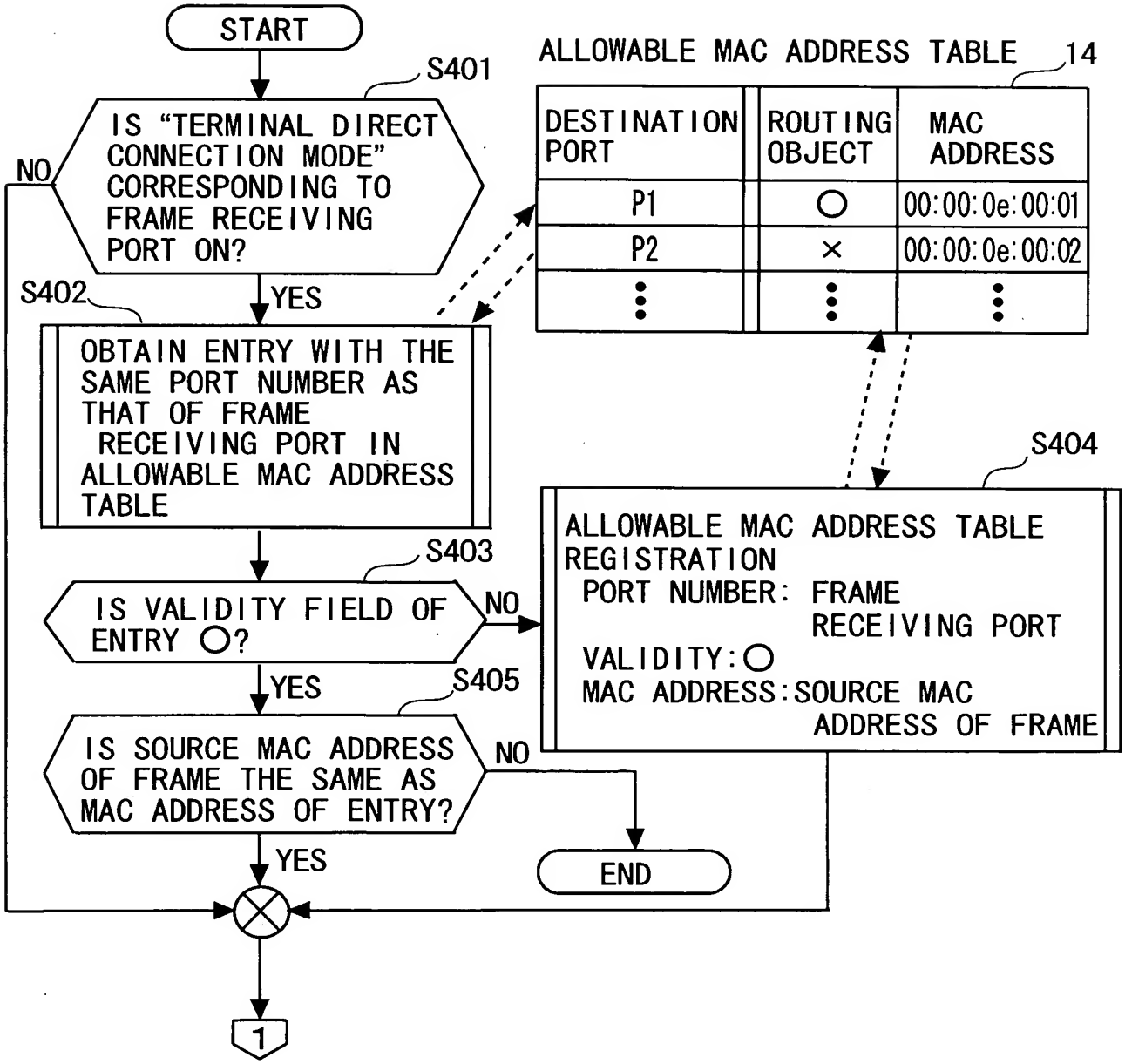

START
S401
IS "TERMINAL DIRECT CONNECTION MODE" CORRESPONDING TO FRAME RECEIVING PORT ON?
NO
YES
S402
OBTAIN ENTRY WITH THE SAME PORT NUMBER AS THAT OF FRAME RECEIVING PORT IN ALLOWABLE MAC ADDRESS TABLE
S403
IS VALIDITY FIELD OF ENTRY ○?
NO
YES
S405
IS SOURCE MAC ADDRESS OF FRAME THE SAME AS MAC ADDRESS OF ENTRY?
NO
YES
END
1
ALLOWABLE MAC ADDRESS TABLE
14
DESTINATION PORT
ROUTING OBJECT
MAC ADDRESS
P1
○
00:00:0e:00:01
P2
×
00:00:0e:00:02
S404
ALLOWABLE MAC ADDRESS TABLE REGISTRATION
PORT NUMBER: FRAME RECEIVING PORT
VALIDITY:○
MAC ADDRESS:SOURCE MAC ADDRESS OF FRAME

FIG. 10A

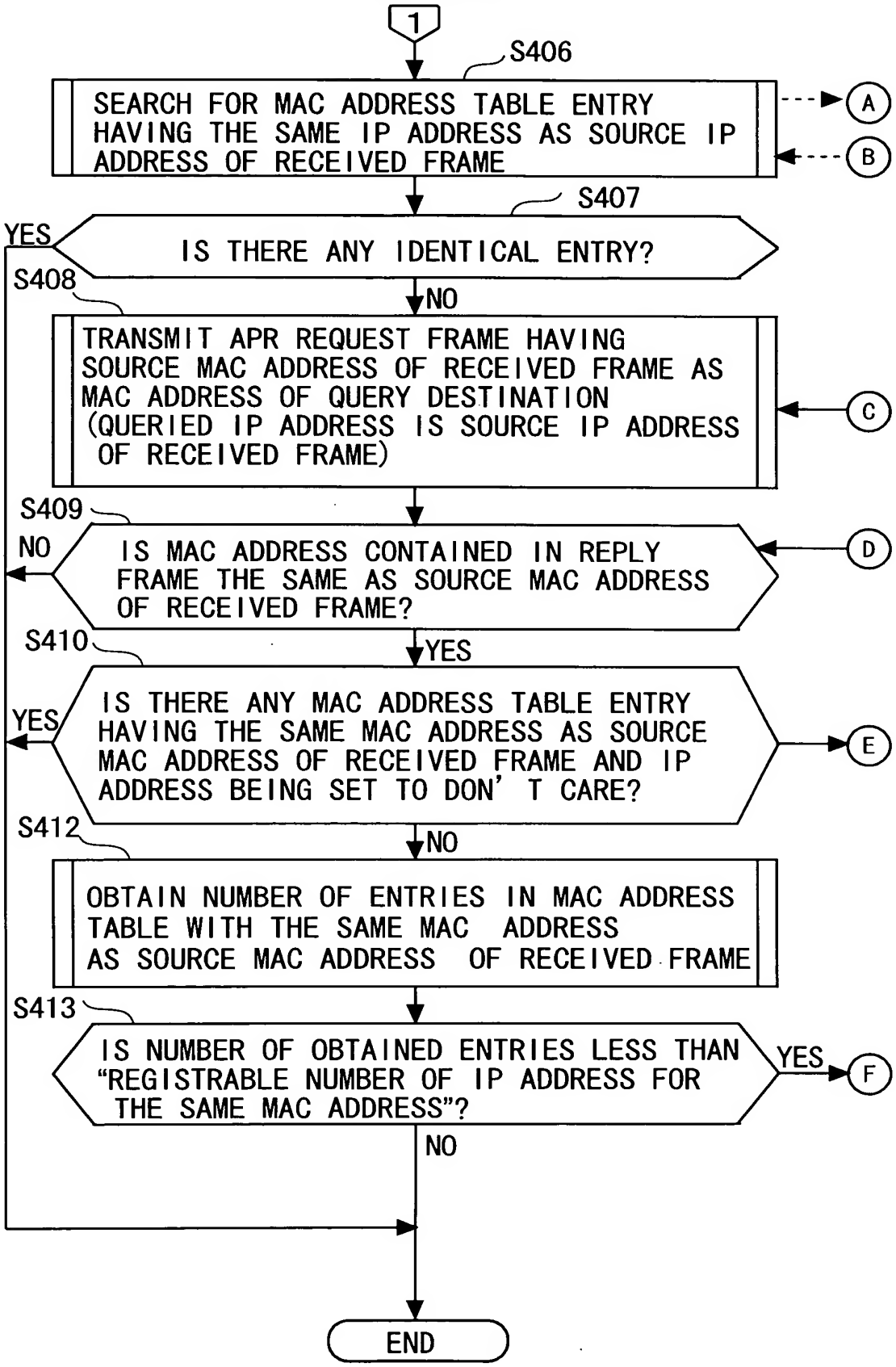
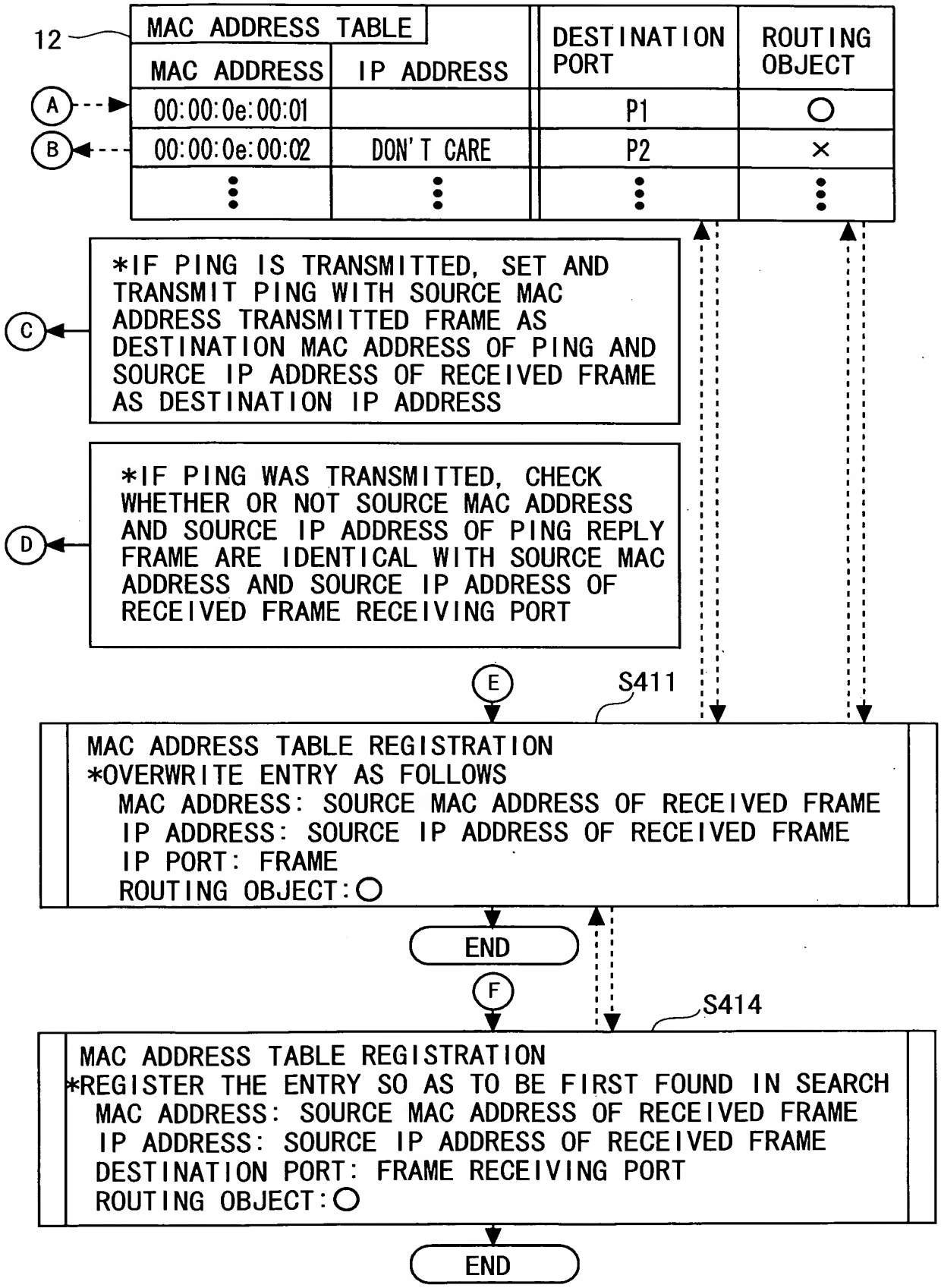

1
S406
SEARCH FOR MAC ADDRESS TABLE ENTRY HAVING THE SAME IP ADDRESS AS SOURCE IP ADDRESS OF RECEIVED FRAME
A
B
S407
YES
IS THERE ANY IDENTICAL ENTRY?
S408
NO
TRANSMIT APR REQUEST FRAME HAVING SOURCE MAC ADDRESS OF RECEIVED FRAME AS MAC ADDRESS OF QUERY DESTINATION (QUERIED IP ADDRESS IS SOURCE IP ADDRESS OF RECEIVED FRAME)
C
S409
NO
IS MAC ADDRESS CONTAINED IN REPLY FRAME THE SAME AS SOURCE MAC ADDRESS OF RECEIVED FRAME?
D
S410
YES
YES
IS THERE ANY MAC ADDRESS TABLE ENTRY HAVING THE SAME MAC ADDRESS AS SOURCE MAC ADDRESS OF RECEIVED FRAME AND IP ADDRESS BEING SET TO DON' T CARE?
E
S412
NO
OBTAIN NUMBER OF ENTRIES IN MAC ADDRESS TABLE WITH THE SAME MAC ADDRESS AS SOURCE MAC ADDRESS OF RECEIVED FRAME
S413
IS NUMBER OF OBTAINED ENTRIES LESS THAN "REGISTRABLE NUMBER OF IP ADDRESS FOR THE SAME MAC ADDRESS"?
YES
F
NO
END

FIG. 10B


12
MAC ADDRESS TABLE
MAC ADDRESS
IP ADDRESS
DESTINATION PORT
ROUTING OBJECT
A
00:00:0e:00:01
P1
○
B
00:00:0e:00:02
DON'T CARE
P2
×
*IF PING IS TRANSMITTED, SET AND TRANSMIT PING WITH SOURCE MAC ADDRESS TRANSMITTED FRAME AS DESTINATION MAC ADDRESS OF PING AND SOURCE IP ADDRESS OF RECEIVED FRAME AS DESTINATION IP ADDRESS
C
*IF PING WAS TRANSMITTED, CHECK WHETHER OR NOT SOURCE MAC ADDRESS AND SOURCE IP ADDRESS OF PING REPLY FRAME ARE IDENTICAL WITH SOURCE MAC ADDRESS AND SOURCE IP ADDRESS OF RECEIVED FRAME RECEIVING PORT
D
E
S411
MAC ADDRESS TABLE REGISTRATION
*OVERWRITE ENTRY AS FOLLOWS
MAC ADDRESS: SOURCE MAC ADDRESS OF RECEIVED FRAME
IP ADDRESS: SOURCE IP ADDRESS OF RECEIVED FRAME
IP PORT: FRAME
ROUTING OBJECT:○
END
F
S414
MAC ADDRESS TABLE REGISTRATION
*REGISTER THE ENTRY SO AS TO BE FIRST FOUND IN SEARCH
MAC ADDRESS: SOURCE MAC ADDRESS OF RECEIVED FRAME
IP ADDRESS: SOURCE IP ADDRESS OF RECEIVED FRAME
DESTINATION PORT: FRAME RECEIVING PORT
ROUTING OBJECT:○
END